DOCUMENT RESUME

ED 217 271 CE 032 907

TITLE Fire Types & Prevention. Pre-Apprenticeship Phase 1 Training.
INSTITUTION Lane Community Coll., Eugene, Oreg.
SPONS AGENCY Employment and Training Administration (DOL), Washington, D.C.; Oregon State Dept. of Education, Salem.
PUB DATE 79
NOTE 16p.; For related documents see CE 032 866-930 and ED 213 887-905.

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Behavioral Objectives; *Fire Protection; Individual Instruction; Learning Modules; Pacing; Postsecondary Education; Prevention; Safety; *Safety Education; Secondary Education; Tests; *Trade and Industrial Education; Two Year Colleges
IDENTIFIERS Fires; *Occupational Safety and Health; *Preapprenticeship Programs

ABSTRACT

This self-paced student training module on fires and fire prevention is one of a number of modules developed for Pre-apprenticeship Phase 1 Training. Purpose of the module is to teach students to identify job site fire hazards and determine the classifications of fires and the extinguishment method necessary to put them out safely. The module may contain some or all of the following: a cover sheet listing module title, goal, and performance indicator; study guide/checklist with directions for module completion; introduction; information sheets providing information and graphics covering the module topic(s); self-assessment; self-assessment answers; post assessment; and post-assessment answers. (YLB)

INDIVIDUALIZED LEARNING SYSTEMS

PRE-APPRENTICESHIP PHASE 1 TRAINING

FIRE TYPES & PREVENTION

Goal:

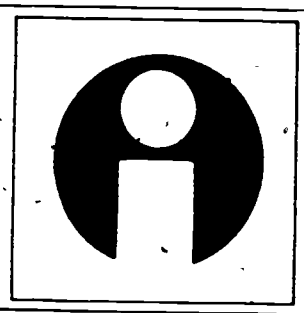
The student will be able to identify job site fire hazards, determine the classifications of fires and the extinguishment method necessary to put them out safely.

Performance Indicators:

Performance on learning the concepts of this module will be measured by successful completion of:

1) An assignment sheet requiring the apprentice to check possible fire hazards of his or her place of business or job site
2) Assessment exams covering the module's information.

Study Guide



This module, on Fire Prevention, discusses in greater detail the classes of fires and the safest, most efficient methods of extinguishment. The Assignment section of this module is a fire hazard and prevention check list which requests the apprentice to familiarize him- or herself with the possible fire hazards found around the job site or shop. For successful completion of this module, you will:

1. ____ Familiarize yourself with the module's Goals and Performance Indicators.

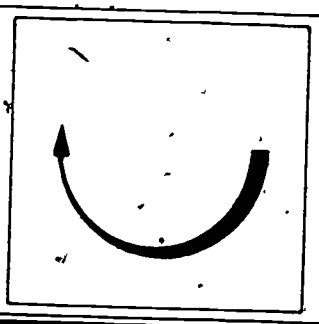
2. ____ Study the Information section.

3. ____ Read and fill in the Assignment check list as it pertains to your job or work site.

4. ____ Complete the Self Assessment section of the module.

5. ____ Complete the Post Assessment section of the module.

Information



You can cool off a fire in your workplace by applying a substance to absorb the HEAT. The most common agent used to cool a fire is water. Water CANNOT be used on all kinds of burning materials; however, more about this later in the lesson.

You can reduce the amount of oxygen available to a fire in your workplace by applying an agent to SMOTHER the burning area. Covering the area with dry chemicals is one way of smothering the fire. Throwing dirt or sand on the fire would be another way of excluding air. Foam also smothers a fire. In addition, foam cools a fire somewhat because of the water it contains.

If flammable gases catch fire as they flow from a pipe directly outside your workplace and you manage to put out the fire by shutting off the source of the gases that are burning, this would be an example of REMOVING THE FUEL from the fire.

There are different ways of putting out fires, depending on what is burning. For example, you can use water to extinguish a wood fire in your workplace, but you should not use water in liquid form for grease fires, fires involving energized electrical equipment, or burning metal. However, water in the form of fog will rapidly form steam in the presence of heat and can be used effectively for grease fires or fires involving energized electrical equipment.

TYPES OF FIRES

IN ADDITION TO WOOD FIRES, FIRES IN OTHER ORDINARY COMBUSTIBLE MATERIALS LIKE PAPER, CLOTH, RAGS, RUBBER, AND TRASH ARE CALLED "CLASS A" FIRES. If you have a fire in a pile of wood shavings in your woodworking shop, this is an example of a Class A fire.

FLAMMABLE LIQUID AND GAS FIRES, SUCH AS OIL, GASOLINE, PAINT, AND GREASE, ARE "CLASS B" FIRES. If a fire develops in a small liquid solvent dip tank in your workplace, this is a Class B fire.

IF THERE IS A FIRE IN ENERGIZED ELECTRICAL EQUIPMENT IN YOUR AREA, IT IS CALLED A "CLASS C" FIRE. ("Energized" means the equipment is still reciving electricity from the electrical power supply.) These kinds of fires are tricky to put out until the electrical equipment is disconnected or the power supply is interrupted, because there is the risk of a firefighter, machine operator, or observer being shocked or electrocuted. For this reason you would not use water in liquid form on an electrical equipment fire in your workplace until the equipment is disconnected or the power supply interrupted because a straight stream of water conducts electricity back to the firefighter or others in the vicinity. However, water in the form of fog is a nonconductor and can be used within two feet of electrical gear.

If you have a Class C electrical equipment fire in your workplace, some extinguishers you can use are: CARBON DIOXIDE, DRY CHEMICALS, or MULTIPURPOSE DRY CHEMICALS. You use the carbon dioxide to reduce the amount of oxygen in the air. You use the dry chemicals or multipurpose dry chemicals to smother the fire. These extinguishants do not conduct electricity so they are safe to use on Class C fires involving electricity.

When you put out a Class C fire in energized electrical equipment by diluting the oxygen in the air with CARBON DIOXIDE or by smothering the fire with DRY CHEMICALS or MULTIPURPOSE DRY CHEMICALS, you are reducing the oxygen available to the fire.

As soon as you have extinguished the fire, be sure to disconnect the electrical equipment or interrupt the power supply to avoid another fire caused by the same short circuit or other condition that caused the fire you just put out. Reconnect the electrical equipment only after you have discovered and eliminated the cause of the fire.

THE ONLY THING THAT MAKES A CLASS C FIRE DIFFERENT FROM A CLASS A OR B FIRE IS THE FACT THAT ELECTRICITY IS INVOLVED. If you have to fight a fire in equipment receiving power from the electrical power supply, you have to use one of the extinguishing agents that does not conduct electricity. However; IF YOU CAN MANAGE TO DISCONNECT THE EQUIPMENT FROM THE POWER SUPPLY OR TURN OFF THE POWER SUPPLY, THEN YOU CAN FIGHT THE FIRE AS IF IT WERE A CLASS A OR B FIRE, depending on what else is burning. This means that disconnecting electrical equipment turns a Class C fire into a Class A or B fire, depending on what is burning.

A FIRE IN METAL OR METALLIC DUST IS A CLASS D FIRE. Putting out a Class D fire is

tricky because there is the chance of a dangerous chemical reaction between some of the commonly used extinguishants and the burning metal. Putting water on a burning magnesium, for example, will cause an EXPLOSION: This means that if you use the wrong extinguishant, it can make a Class D fire worse.

FIGHTING CLASS D FIRES IN METALS REQUIRES A SPECIFIC CHEMICAL FOR EACH SPECIFIC METAL. This means that deciding what extinguishant to use on a particular Class D fire is not simple. This is a decision that should be made by a fire protection specialist.

To prepare youself for fighting a Class D fire that might break out in your workplace, you would do the following things:

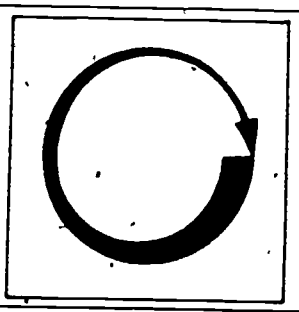
- make a list of the metals in your workplace
- find out which ones will burn
- find out what specific chemical extinguishant to use for each specific burnable metal on your list

The following page contains a chart of the four classifications, their symbols and methods of extinguishment.

CLASS	CHARACTERISTIC	EXTINGUISHMENT
ORDINARY  COMBUSTIBLES	Fires involving ordinary combustible materials such as wood, cloth, paper, rubber and many plastics.	Water is used in a cooling or quenching affect to reduce the temperature of the burning materials below its ignition temperature.
FLAMMABLE  LIQUIDS	Fires involving flammable liquids, greases, and gases.	The smothering or blanketing effect of oxygen exclusion is most effective. Other extinguishing methods include removal of fuel and temperature reduction.
ELECTRICAL  EQUIPMENT	Fires involving energized electrical equipment.	This fire can sometimes be controlled by a nonconducting extinguishing agent. The safest procedure is always to attempt to de-energize high voltage circuits and treat as a Class A or B fire depending upon the fuel involved.
COMBUSTIBLE  METALS	Fires involving combustible metals, such as magnesium, titanium, zirconium, sodium and potassium.	The extremely high temperature of some burning metals makes water and other common extinguishing agents ineffective. There is no agent available that will effectively control fires in all combustible metals. Special extinguishing agents are available for control of fire in each of the metals and are marked specifically for that metal.

Common extinguisher classification symbols, their characteristics and extinguishment. The symbols may be found singly or in combination.

Assignment



This list will help call attention to any fire hazards that may need correcting. You can make an inspection of your plant or business that will be useful in pointing out fire dangers.

Statistics show that after a fire only 43 percent of the companies resume business and 28 percent of those resuming business fail within three years. FIRE COULD PUT YOU OUT OF WORK! As part of this module, you are required to complete this check list by placing a check ( ) in the appropriate slot after examining the following areas in your workplace. Return this section to your instructor for review.

SMOKING

Careless smoking habits are one of the most common causes of fires. Employees should continually observe that "no smoking" regulations are obeyed. Ashtrays should be provided that are of sufficient size and will not permit the cigarette to fall out as it burns down. Ashtrays should be provided in all areas where smoking is permitted.

1. Safety type ashtrays in use ___
2. Smoking regulations enforced ___
3. "No smoking" signs posted where necessary ___
4. Safety type metal swing top wastebaskets used in designated areas ___

COMBUSTIBLE STORAGE AND WASTE MATERIALS

Combustible materials should be stored and maintained in a neat and orderly manner, preferably with the materials being stored in their original containers. No combustible storage of any kind should be permitted in the boiler room, or near stoves, water heaters, or other types of heating appliances.

Combustible waste materials should be stored in strong constructed, all metal containers, with tight fitting covers. Containers should be emptied daily and the waste safely disposed of.

5. Combustible materials stored neat and orderly ___
6. Combustible storage away from heat producing equipment ___
7. No combustible storage in the boiler room ___
8. Waste materials stored in proper containers ___
9. Waste containers emptied on each shift or more frequently when needed ___

FLAMMABLE LIQUIDS AND COMPRESSED GASES

Flammable liquids and compressed gases, plant solvents, thinners, and other flammable liquids should be stored in metal cabinets, away from open flames and heating devices. Flammable liquids in quantities of one gallon or more in use should be stored in Underwriters Laboratories listed safety cans. Solvent soaked rags should not be stored in the building.

Compressed gas cylinders should be stored in a designated area away from heat producing devices. The caps should remain on the cylinders when not in use, and the cylinders secured to a wall. Flammable liquids or gases should not be stored adjacent to oxidizing agents.

10. Flammable liquids properly stored in metal cabinets ___
11. Safety can be provided for flammable liquids when in use (one gallon or more) ___
12. Smoking prohibited adjacent to flammable liquid storage ___
13. Compressed gas cylinders stored in designated areas ___
14. Compressed gas cylinders properly secured ___
15. Caps on cylinders when not in use ___

ELECTRICAL WIRING AND EQUIPMENT

Electrical equipment should be in good repair. Light cords should be free from wear and defects and should not be run under rugs or carpeting. Electrical circuits should not be overloaded or overfused. 15 ampere is generally used in lighting circuits; 20 ampere or more for special equipment circuits. Electrical motors, fans, heaters and other appliances should be kept free from the accumulation of lint and grease. Combustible items should not be allowed to come into contact with incandescent light bulbs.

16. Proper electrical load on each circuit ___
17. No excessive heating noted in circuit breaker or fuse panels ___
18. No excessive multiple wiring connections to wall receptacle ___
19. Grounding of all electrical appliances ___
20. Proper size fuse in use ___
21. Light bulbs not in contact with combustibles ___
22. All lamps and appliance cords free from wear and defects ___
23. Electrical motors, fans, heaters and appliances clean and free from defects ___
24. Extension cords properly used ___

EXITS, EXITWAYS AND EXIT SIGNS

All exits shall be clearly marked with appropriate and illuminated exit signs. Corridors and hallways shall be kept free of obstructions and sufficiently light for safe usage. Outside fire escapes, stairs and walks to public thoroughfares shall be free of objects that may impede evacuation or impair fire department operations. They should also be kept free of ice and snow.

25. All exits properly and clearly marked with illuminated signs ___
26. All illuminated exit signs lit ___
27. All exit doors, stairways and exitways unobstructed ___
28. Furniture placed so occupants can quickly and safely evacuate ___
29. Grounds kept clear of objects that might impede evacuation ___
30. All fire escapes, stairs and walks free from snow and ice ___

FIRE AREA SEPARATIONS

Fire and smoke stop doors and windows should be maintained in a serviceable condition. Self-closing fire doors, which are normally kept closed, shall not be held open by the use of wedges or other devices. Automatic closing fire and smoke stop doors shall be maintained in working order.

31. Door operate properly ___
32. Doors unobstructed ___
33. Necessary doors kept closed ___
34. Doors held open, electrically close when actuation of
    a. sprinkler systems ___
    b. manual pull boxes ___
    c. smoke detectors ___

SPRINKLER, FIRE DETECTION AND ALARM SYSTEMS

Sprinkler valves shall be readily accessible and electrically supervised in the open position.

The water flow alarm should be tested to insure proper operation. Valves should operate easily and checks made for leaks, corrosion and other defects.

35. Sprinkler valves accessible and sealed open ___
36. No leaks, corrosion, or other defects noted in sprinkler system ___
37. Sprinkler systems waterflow alarms tested (semi-annually) ___
38. Gate valve supervisory switch on sprinkler system tested (monthly) ___
39. Sprinkler systems serviced by qualified individuals (annually) ___
40. Fire detection and alarm system tested (weekly) ___
41. Fire alarm boxes accessible ___
42. All alarm boxes tested (monthly) ___

EXTINGUISHERS AND HOSE STATIONS

Extinguishers should be of the proper type to extinguish fires in area of coverage. The extinguisher should be strategically located and well marked. Proper maintenance of extinguishers is necessary to insure proper discharge in an emergency situation.

43. All extinguishers mounted in designated locations ___
44. Extinguisher seals intact and inspection tag initiated ___
45. No leaks, corrosion or other defects noted ___
46. Extinguishers unobstructed ___
47. Extinguishers serviced by a qualified agency (annually) ___
48. Extinguishers hydrostatically tested (every 5 years) ___
49. Appropriate extinguisher located adjacent to hazard ___
50. Cabinet doors on hose station operate properly ___
51. Hose in good condition ___
52. Rerack hose (annually) ___
53. Nozzle in place ___

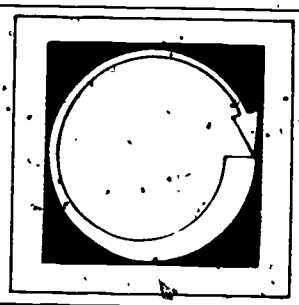
EMERGENCY LIGHTS

Emergency lights should be stratigically located to provide sufficient illumination on all exits from a building. Battery and generator powered emergency lights shall be wired according to applicable codes. A competent individual should be assigned to maintain and test the emergency equipment.

Emergency procedures shall be written to provide guidance in case of fire or other catastrophe. Each individual should know his or her duties during the emergency situation. Fire Department should be invited into the plant to suggest proper emergency procedures and to demonstrate the use of fire protection equipment.

54. Batter powered emergency lights tested (weekly) ___
55. Written record of testing up to a date ___
56. Emergency generator tested (weekly) ___
57. One fire drill per month (each shift - 4 drills per year or as required by local or state codes) ___
58. Fire drill records up to date ___
59. Fire department invited to participate in drill ___
60. Fire department participated in drill ___

Self Assessment



Select the answers which correctly complete the following statements and write the answers in the blanks at the left of each statement.

1. ___ Saying that Class A fires are fires in ordinary combustible materials like wood, paper, and cloth is an example of classifying fires on the basis of which of the following:
   a. the material that is burning
   b. what it takes to put the fire out

2. ___ If you use WATER to put out a Class A fire in wood, paper, or cloth in your workplace, you are ___ the fire.
   a. cooling
   b. smothering

3. ___ If you use multipurpose dry chemicals to put out a Class A fire in wood, paper, or cloth in your workplace, you are ___ the fire.
   a. cooling
   b. smothering

4. ___ Saying that Class B fires are fires in liquids, grease, oil paint, and gases is an example of categorizing fires on the basis of which of the following:
   a. the material that is burning
   b. what it takes to put the fire out

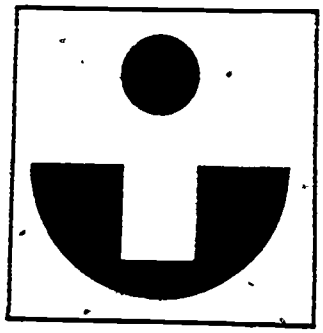
5. ___ If a fire breaks out in an energized electric generator in your workplace, this would be a Class ___ fire.
   a. A
   b. B
   c. C

6. You would fight a Class C fire in energized electrical equipment with extinguishants that ___ conduct electricity.

a. do

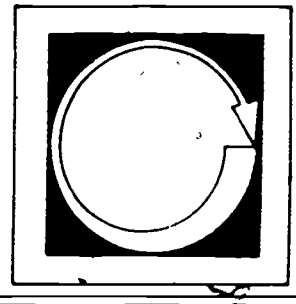
b. do not

Self Assessment Answers



1. a
2. a
3. b
4. a
5. c
6. b

Post Assessment



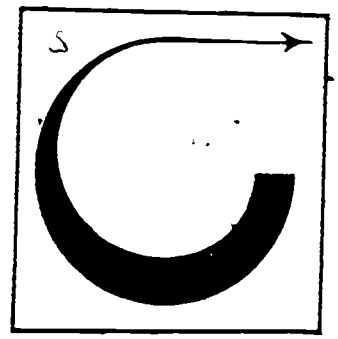
1. Label the extinguishants below as to whether you would use them for Class A or Class B fires, or both.
   a. water in liquid form _____
   b. foam _____
   c. carbon dioxide _____
   d. dry chemicals _____
   e. multipurpose dry chemical _____

2. Saying that a Class D fire is a fire in METAL is an example of cateogrizing fires on the basis of which of the following?
   a. the material that is burning
   b. what it takes to put the fire out

3. Class _____ fires are fought with heat-absorbing chemicals that do not react with burning metals.
   a. Class A
   b. Class B
   c. Class C
   d. Class D

4. Label the following materials as to whether they are involved in Class A, B, C or D fires.
   a. metals _____
   b. energized electrical equipment _____
   c. wood, paper, cloth _____
   d. liquids, oil, grease _____

Instructor Post Assessment Answers



1. a. A
   b. A
   c. A or B
   d. A or B
   e. A or B

2. a

3. d

4. a. D
   b. C
   c. A
   d. B